

We Claim:

1. A method for separating particles utilizing at least in part optical forces, comprising the steps of:

5 providing a population of particles,

first illuminating the particles with a line of light, and moving the line of light relative to the particles, so as to arrange the particles in a line, and

10 second moving the line of illumination relative to the particles having been in the line, at a speed to effectively separate some of the particles arranged in a line.

15 2. The method of claim 1 wherein the first moving of the line to collect particles is at a uniform speed.

20 3. The method of claim 1 wherein the direction of the first movement is opposite to that of the second motion.

25 4. The method of claim 1 wherein the sample field is sectioned.

5. The method of claim 4 wherein the sectioned field is an $n \times n$ array.

20 6. The method of claim 1 wherein the second motion is a step motion.

25 7. The method of claim 6 wherein the step motion moves less than $\frac{1}{4}$ of the field distance.

8. The method of claim 1 wherein the relative motion of the light relative to the particle results from movement of the stage.

30 9. The method of claim 1 wherein the relative motion of the light relative to the particle results from movement of the light.

10. The method of claim 1 wherein the relative motion of the particles and the light is substantially $6\mu/\text{second}$.

11. The method of claim 1 wherein particles separate red blood cells from white blood cells.

5 12. The method of claim 1 wherein particles separate maternal blood cells from fetal blood cells.

13. The method of claim 1 wherein the second motion is at a speed less than the escape velocity of at least certain of the particles in the population.

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14. The method of claim 1 wherein particles separate maternal blood cells from fetal blood cells.

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15 15. The method of claim 1 wherein particles separate reticulocytes from mature

red blood cells.

16. The method of claim 1 wherein particles separate out stem cells.

20 17. The method of claim 1 wherein particles separate out tumor cells from blood.

18. The method of claim 1 wherein the population includes sperm cells.